

# **EXHIBIT A**

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF VIRGINIA**

DIRECTPACKET RESEARCH, INC.,

*Plaintiff,*

v.

POLYCOM, INC.,

*Defendant.*

No. 2:18-cv-331-AWA-LRL

**DECLARATION OF KEVIN JEFFAY, PH.D.**

I submit this declaration on behalf of directPacket Research, Inc. to provide my opinions regarding United States Patent Nos. 7,773,588, 7,710,978, and 8,560,828 (together, the “Patents-in-Suit”). The facts stated herein are based on my own knowledge, and the opinions expressed were formed based upon my review of information provided to me and my expertise and experience.

**QUALIFICATIONS**

1. A current version of my *curriculum vitae* is attached as Exhibit 1.

**CLAIM CONSTRUCTION STANDARDS**

2. I understand from counsel for directPacket (“counsel”) that patent claim terms are construed from the perspective of a person having ordinary skill in the art (a “skilled artisan”) as of the effective filing date of the patent application. I understand from counsel that the Patents-in-Suit have a filing date of April 13, 2006, and that I should use this date for my analysis. Moreover, claim terms should be considered in the context of the patent claim in which they appear, as well as in the context of the other claims, the specification, and the patent’s prosecution history, taken as a whole, as opposed to in isolation or out of context. Additionally, it may be appropriate to consider evidence that is extrinsic to the patent and its prosecution history, provided this extrinsic evidence is not used to alter or contradict the meaning established by the intrinsic evidence of the patent and its prosecution history.

### **THE PERSON OF ORDINARY SKILL IN THE ART**

3. A person of ordinary skill in the art would either have 4-5 years of experience in the field of computer networking with an emphasis on multimedia communication over computer networks, or a Master's degree in Electrical Engineering or Computer Science and 2-3 years of experience.

### **TECHNICAL BACKGROUND OF THE PATENTS-IN-SUIT**

4. The Patents-in-Suit are directed toward systems, methods, and machines that facilitate multimedia communication across computer networks, in support of applications such as videoconferencing, Internet telephony, and virtual collaboration.

5. Multimedia communication sessions (*e.g.*, videoconferences over the Internet) typically involve the real-time exchange of multimedia communication data (*e.g.*, audio, video, and control data) between two or more endpoint devices (*e.g.*, webcams, projectors, microphones, etc.). To facilitate these communication sessions and ensure compatibility between different endpoint devices, network protocols were developed that standardized how endpoint devices communicate with one another.

6. These protocols define the procedures used to establish a communication session (*e.g.*, the format and sequence of messages to be exchanged) and the manner in which multimedia data is communicated between endpoints (*e.g.*, the format of an audio or video data stream). These protocols may also specify that messages within the protocol conform to a particular format. Two examples of industry-accepted protocols used to conduct multimedia communication sessions over computer networks are: (i) the H.323 suite of protocols; and (ii) the Session Initiation Protocol ("SIP") and related media transport protocols such as Real-Time Transport Protocol ("RTP").

7. The emergence of multiple protocols created issues of compatibility, as devices using protocols from one family (*e.g.*, H.323) would not be capable of communicating with devices using protocols from another (*e.g.*, SIP). Moreover, while protocols like H.323 and SIP were intended to standardize communication between different endpoint devices, in reality, this was far from the case.

In practice, different endpoint devices and/or applications (*e.g.*, from different manufacturers) would each implement its own variant of H.323 and/or SIP. Thus, two devices, both employing H.323, for example, could be incompatible with one another and incapable of carrying on a multimedia communication session. The inventions claimed in the Patents-in-Suit improve system interoperability by allowing for effective communication between devices implementing different variants of H.323 and/or SIP.

8. As mentioned above, data exchanged between endpoint devices as part of these sessions must be formatted in a particular manner, in part, to allow the data to travel across computer networks. In order to do so, the data is segmented into relatively small units, which are then formed into data packets. These data packets include a “header” containing address and control information, and a “payload” containing application data. A packet of data, for example, can include a “header” having both a “source address” identifying the device sending the packet, and a “destination address” identifying the device destined to receive the packet. These “source” and “destination” addresses are used by network devices (*e.g.*, routers) to direct the packets from their source to their destination.

9. The packet headers may also include a “source port number” and “a destination port number.” These port numbers are used to identify the application that generated the packet and the application that should receive the packet. H.323 and SIP, by design, employ multiple network port numbers to coordinate and carry out real-time, two-way multimedia communication (*e.g.*, using separate port numbers to exchange voice, video, and control data).

10. When the H.323 and SIP protocols were first developed, multimedia communication was in its infancy and the archetypical use case was intra-office videoconferencing, in which both endpoint devices existed on the same network and network traffic flowed freely between endpoints (*i.e.*, peer-to-peer conferencing that did not encounter network security devices such as firewalls). In that

context, the use of multiple ports for multimedia communication was not very problematic, because data packets could be freely routed within the network.

11. As the Internet matured and network links had increased capacity, the desire to conduct multimedia communication sessions across disparate, geographically distant networks grew. But the use of multiple ports in such situations was often infeasible as network security devices or network configurations intended to secure an organization's network from potential bad actors outside the organization's network would often prevent multimedia communication packets from reaching their intended destination. As a result, communication sessions suffered from poor quality or would fail altogether (*e.g.*, users would commonly experience dropped calls, one-way audio, *etc.*).

12. Network firewalls, in particular, presented a significant barrier to inter-network communications. A firewall secures a computer network and prevents unwanted or malicious traffic from entering (or leaving) a computer network or system. One technique a firewall may use to provide security is packet filtering, wherein the firewall determines whether to allow individual packets to pass through the firewall by analyzing information in the packet's header (*e.g.*, allowing or denying entry based on the destination port number specified in the packet). When heightened security is desired, network administrators may employ a restrictive policy "closing off" access to all but a select few ports, which are associated with a desired service or application. A firewall, for example, may be configured to only "open" a single port, *e.g.*, port 80 (the standard port for world-wide web traffic).

13. More generally, the Internet Assigned Numbers Authority ("IANA") maintains a registry of port numbers and the application or service that is associated with each number. The registry maintained by IANA is subdivided into three ranges – the "well-known" or "system" ports, ranging from 0 through 1023; the "registered" or "user" ports, ranging from 1024 through 49,151; and, the "dynamic" or "private" ports, ranging from 49,152 through 65,535. Port numbers in the well-known and registered port number ranges are available for assignment to applications through IANA

following a review and approval process. In contrast, port numbers in the dynamic range are purposely not assigned and are free for any application to use. While firewalls can be configured to allow traffic on any port, they typically will permit traffic only over well-known or registered ports to enter a network. Because multimedia communication protocols like those in the SIP and H.323 families use both registered and dynamic ports, firewalls can block some or all of the data packets sent between endpoint devices in an H.323 or SIP communication session, effectively preventing communication between the devices.

14. To address these problems, firewalls would need to be specially configured (or bypassed entirely) in order to allow for H.323 or SIP data packets associated with a multimedia communication session to enter or leave a network (*i.e.*, to “traverse” the firewall). A network administrator, for example, could reconfigure a firewall to “open” specific ports required for a videoconference. But manipulating the firewall in this way was a manual and time-consuming task. As such, human error or poor operational practices in this process introduced the risk of misconfiguring the firewall and leaving the network vulnerable to attack. Consequently, the network would be vulnerable to malicious traffic entering through the “opened” ports long after the communication session had ended.

15. Manual firewall manipulation was practically infeasible given the dynamic nature of multimedia communication sessions. For example, additional audio or video channels are commonly initialized in the middle of a videoconference call (*e.g.*, as a presentation begins), and supplemental services (*e.g.*, camera control) can be added at any time. It was difficult for network administrators to handle these dynamic events and “open” the requisite ports on the fly. A simple alternative available to network administrators was to allow endpoint communication devices to bypass the firewall entirely. But these endpoint communication devices could be compromised, allowing outside attackers direct access to the network.

16. The inventions claimed in the Patents-in-Suit represent an improvement in the way videoconferences are managed within organizations. Unlike prior solutions, the inventions claimed in the Patents-in-Suit facilitate multimedia communication without requiring manipulation or bypassing of network firewalls and without sacrificing security. Specifically, the inventions claimed in the Patents-in-Suit simplify the use of the multiport communication protocols typically used for videoconferencing (*e.g.*, H.323 or SIP) by converting them into a single-port protocol that can transmit data through firewalls and thus across the Internet. This enables multimedia communications without requiring any manipulation of the firewall.

### **TERMS TO BE CONSTRUED**

17. As discussed below, the constructions proposed by directPacket are consistent with how these terms would have been understood by a skilled artisan at the time the Patents-in-Suit were filed, and remain faithful to the claims, the patent specification, and the extrinsic evidence cited by the parties. They should be adopted.

#### **1. “a [first/second/interim/intermediate] protocol”**

18. This term, as it is used in the '588 Patent, would have been readily understood by a skilled artisan, and thus, no construction of the term is necessary. To the extent that a construction is required, a skilled artisan would have understood the term to mean “a [first/second/interim/intermediate] set of conventions governing the format of messages exchanged between two communication devices,” as directPacket proposes. Such a construction is consistent with the language of the claims, the patent specification, and the extrinsic evidence cited by the parties.

19. More particularly, it is my understanding that the parties agree on the meaning of the term “protocol” but disagree as to the significance of the modifiers “first,” “second,” “interim,” and “intermediate.” In the context of the claims, these terms refer to the protocols used to communicate the claimed “multimedia data stream” between the claimed source and target communication devices.

20. I understand that Defendant contends that the term be construed as follows: “each of the first, second, and [interim/intermediate] protocols includes a signaling protocol whereby no two signaling protocols are the same.” The claims, however, require the transmission and receipt of “*multimedia* data streams” and “*multimedia* data” in the “first” and “second” protocol. A skilled artisan would have understood the “first” and “second” protocols as governing the format of messages conveying both signaling *and* media data. Such an understanding is also consistent with the specification, which describes H.323 and SIP as “umbrella” protocols, responsible for communicating “multimedia traffic.” (’588 Patent at 1:31-34). Defendant’s proposed construction also implicitly requires the intermediate protocol, to comprise a signaling protocol. This, however, does not naturally follow from either the claims or the specification. Moreover, nothing in the claims nor the specification require the protocols to be different as Defendant proposes, and the specification appears to contemplate the exact opposite. For example, as disclosed in Figures 1A and 1B, and their related description, the specification clearly contemplates that the “first protocol” used by endpoints 101 and 102 and the “second protocol” used by endpoints 106-109 may both be text-based protocols or both be binary protocols.

21. Generally, as well as within the context of the ’588 Patent, a skilled artisan would have understood that “converting a protocol,” means to take messages formatted according to a first protocol and convert them to the appropriate messages in a second protocol. That is, “converting a protocol” refers to a conversion of messages (all messages) generated by an instance of an implementation of a protocol and not to, for example, a conversion of only some portion or fragment of the total messages generated by the protocol instance.



**2. “[convert/converting] [a/said] first protocol into an [interim/intermediate] protocol”**

22. A skilled artisan would have understood this term to mean “[create/creating] messages, in real time, that are formatted according to an intermediate protocol from the multimedia data stream received in said first protocol,” as directPacket proposes.

23. Given a skilled artisan’s background in networking, she would have understood that protocols govern the format (and interpretation) of messages that are generated by devices using the protocols. The conversion of one protocol to another within the context of the ’588 Patent, therefore, would result in the creation of messages in the second protocol from data received in the first protocol. Given the ’588 Patent claims’ recitation of the target of the conversion being the multimedia data streams received in a first protocol, a skilled artisan would have understood the claimed “converting” to require the generation of messages according to (*i.e.*, formatted according to) the intermediate protocol. Given the patent’s focus on videoconferencing, a skilled artisan would have also understood that the recited “conversion” must occur in real-time in order for any conference to be effective. (’588 Patent at 1:28-30).

**3. “translating said intermediate protocol into a second protocol”**

24. A skilled artisan would have understood this phrase to mean “creating messages, in real time, that are formatted according to a second protocol that is compatible with the target communication device from the multimedia data stream in the intermediate protocol,” as directPacket proposes.

25. The “translating” limitation is similar to the “convert”/“converting” limitations discussed above, in that it is also more appropriately understood as being performed on the multimedia data stream *in* the intermediate protocol, and that it too must be carried out in real-time to facilitate multimedia communication as intended. The term, however, is distinct in that it further connotes the idea that the step of “translating” results in messages that are in “a second protocol” that is known to be compatible with the target communication device.

#### 4. “multiport communication protocol”

26. A skilled artisan would have understood this term to mean “a protocol specifying media and control messages used in conducting real-time two-way multimedia communication and communicated on two or more ports,” as directPacket proposes.

27. A skilled artisan would have understood that a “multiport protocol” is simply a protocol, or confederated set of protocols, that use multiple ports to communicate data. Typically, an application’s desire to separately send application data as well as control (“signaling”) data would have motivated the use of separate, and hence multiple (two or more), ports. In addition, applications could, and did, use multiple ports to send different types of data, such as audio and video data, at the same time.

28. With this understanding, in the context of the ’978 Patent, a skilled artisan would have understood that a “multiport communication protocol” was “a protocol specifying media and control messages used in conducting real-time two-way multimedia communication and communicated on two or more ports.” A skilled artisan would have understood that the first and foremost concern of the ’978 Patent was multimedia communication. (’978 Patent at Title; 1:13-29; 3:64-4:16; 4:2-14; 4:30-34; 4:45-48; 6:59-65). A skilled artisan would expect, and the ’978 Patent teaches, that multimedia communications will include multiple traffic types being transmitted at the same time. For instance, as described in the specification, “communication protocols specify different types of traffic that may be sent between endpoints which include media traffic (voice, video, and the like) along with the control traffic (camera, connection control, and the like).” (’978 Patent at 4:6-10). A skilled artisan would further expect, and have understood, that the patent’s disclosures of video conferencing inherently meant that two-way communications occurs and that the communications must take place in real-time (else human-to-human communication via the video conference would not be possible). (’978 Patent at 1:13-29; 4:30-34; 4:45-48).

**5. “[convert/converting] [a/said] plurality of multiport packets into a plurality of single-port packets in a single-port communication protocol”**

29. A skilled artisan would have understood this phrase to mean “[change/changing] information in [a/said] plurality of packets in said multiport communication protocol, in real-time, and forming a plurality of packets in a single-port communication protocol,” as directPacket proposes.

30. The ’978 Patent teaches that the purpose of the recited “converting” is to convert multiport protocol traffic into single-port protocol traffic so that the latter may traverse a firewall. (’978 Patent at Abstract; 3:3-13; 5:23-37; 6:59-65). Consistent with its plain and ordinary meaning, a skilled artisan would have understood “converting” as applied to multiport packets to mean that the multiport packets are changed in some manner in order to form single-port packets. Any change would require changing some information in the multiport packet (*i.e.*, either its header or payload), and thus a skilled artisan would have understood the claimed “converting” to require changing information in the multiport communication protocol packets in forming single-port communication protocol packets.

31. Indeed, if this were not the case, then a skilled artisan would recognize that no conversion was taking place. The ’978 Patent describes an example of the reconversion of previously converted packets in terms of a hash table that is used to determine (“recover”) the original IP addresses of the converted multiport communication protocol packet. (’978 Patent at 5:27-37). A skilled artisan would appreciate that no hash table (or any other table) would be required to reconstitute the original IP addresses of the converted multiport communication protocol packet if no information in that packet had changed during the conversion process.

32. A skilled artisan would also have understood that the first and foremost concern of the ’978 Patent is multimedia communication. (’978 Patent at Title; 1:13-29; 3:64-4:16; 4:2-14; 4:30-34; 4:45-48; 6:59). A skilled artisan would therefore expect, as the ’978 Patent teaches, that multimedia communications is for the purpose of interactive applications such as telephony and videoconferencing. *Id.* A skilled artisan would further expect, and have understood, that the patent’s

disclosures of these applications inherently meant that two-way communications occurs and that the communications must take place in real-time (else human-to-human communication via the video conference would not be possible). *Id.*

**6. “[reconvert/reconverting] said [received/converted] plurality of single-port packets into said multi-port communication protocol”**

33. A skilled artisan would have understood this phrase to mean “[change/changing] information in said [received/converted] plurality of single-port packets, in real time, and forming a plurality of packets in said multiport communication protocol,” as directPacket proposes.

34. The claims and specification of the ’828 and ’978 Patents make clear that the purpose of the recited “reconverting” process is to transform the single port protocol traffic of the claims back to multiport protocol traffic. Thus, from the claims alone, a skilled artisan would have understood that this phrase required at least “[change/changing] information in said [received/converted] plurality of single-port packets, and forming a plurality of packets in said multiport communication protocol.”

35. This understanding is confirmed by the disclosures in the specifications. For example, in describing the “present invention,” the ’978 Patent states “[m]ultiport protocol traffic from a first endpoint is converted in to a single-port protocol for transport across a network. The traffic is then reconverted to the multiport protocol and directed to the appropriate ports at a targeted second endpoint.” (’978 Patent at 3:6-10). The ’978 Patent specification further describes a method of reversion wherein a portion of the header or data are used to reconvert the single-port packets into multiport packets, thereby “recovering the original IP addresses and ports” in the process. (’978 Patent at 5:33-37). Inherent to this method of reversion is the inclusion of the recovered IP addresses and ports in forming the multiport packets (*i.e.*, changing the information in the single-port packets).

36. For the reasons stated above for the construction of “multiport communication protocol,” and “converting,” a skilled artisan would further have understood that the recited “reversion”

must take place in real-time else the human-to-human communication the patents seek to enable would not be possible.

**7. “commonly-open port”**

37. A skilled artisan would have understood the term to mean “any of the well-known ports or registered ports,” as directPacket proposes.

38. Claim 1 of the ’978 Patent, for example, requires that packets of data in a multipoint communications protocol are converted to packets in a single port communications protocol, which are then transmitted from a first intermediate communication device to (at least) a second intermediate communication device, traversing one or more firewalls through a commonly open port in the process. The specification teaches a form of converting that involves encapsulation, and that when such encapsulated packets are transmitted between intermediate devices, they are done so “using any of the well-known or registered ports, which are the ports that are typically open in standard firewalls.” (’588 Patent at 5:8-10; 5:50-54). From this disclosure, and consistent with the knowledge of a skilled artisan regarding the use of port addresses, she would have understood that a “commonly-open port” was “any of the well-known ports or registered ports.” A skilled artisan would also have understood that meritorious applications had ports assigned to them by a naming authority such as IANA, which operates under the auspices of ICANN to manage assignment of the well-known and registered port ranges (but not the dynamic port range, which a skilled artisan would have understood to be commonly closed on a firewall). (’588 Patent at 1:38-44; 5:10-13). Indeed, by virtue of having an assigned or registered port number, applications were accepted by the Internet community as a “well known” application and the assigned/registered port number became a de facto “well known port.” (See RFC6335, Internet Assigned Numbers Authority (IANA) Procedures for the Management of the Service Name and Transport Protocol Port Number Registry; RFC5226, Guidelines for Writing an IANA Considerations Section in RFCs)(appended hereto as Exs. 2-3). Because these applications

had a registered or assigned port, a skilled artisan would expect that these port numbers would be commonly open on a firewall because they were applications that had gone through a community acceptance process, and hence were not perceived to be malicious. As described in the specification, and consistent with the understanding of a skilled artisan, the well-known and registered ports refer to definite port ranges, namely ports “0 through 1023” and “1024 through 49151,” respectively. (’978 Patent at 1:33-44).

**8. “[first/second] [intermediate communication/network] device”**

39. This term would be readily understood by a skilled artisan, and no construction of the term is necessary. To the extent that a construction is required, a skilled artisan would have understood the term to mean “a [first/second] device that is logically disposed along a communication path between [a first/at least a first] endpoint communication device and [one or more other/at least a second] endpoint communication device[s],” as directPacket proposes.

40. The claims of the ’978 Patent distinguish between an “endpoint communication device,” and an “intermediate communication device.” From both the claims as well as the plain and ordinary meaning of “intermediate,” a skilled artisan would have understood that the intermediate communication device is disposed (in terms of network connectivity) between the endpoint communication devices that are the endpoints of the ultimate communications. Specifically, the data being communicated flows from an originating endpoint communication device, to a first intermediate communication device to a second intermediate communication device and finally to one or more endpoint communication devices. (’978 Patent at 8:46-9:10).

**9. “external controller”**

41. This term would be readily understood by a skilled artisan, and no construction of the term is necessary. To the extent that a construction is required, a skilled artisan would have understood the term to mean “a controller that is not behind [the recited firewall(s)],” as directPacket proposes.

42. Because the claims refer to controllers behind a firewall, a skilled artisan would have understood that an external controller is a controller that is not behind a firewall. The specification of the '828 Patent makes clear that the external controller is not behind the firewall: "Each community provides for communication between the endpoints connected into that community by connecting the endpoints and communication controllers located behind a firewall with ***an external communication controller outside of the firewall***. ('828 Patent at Abstract (emphasis added)). (*See also* '828 Patent at 5:20-23 ("In establishing the communication configuration in one of the communities/sub-communities, a communication request is received at an external controller from a first controller behind a firewall," implying that the external controller is not located with the first controller behind a firewall); 5:51-53 ("Another endpoint requests communication to the internal controller that it is connected to, which then makes that request ***outside of its firewall to the other external controller***" (emphasis added); and FIG. 7).

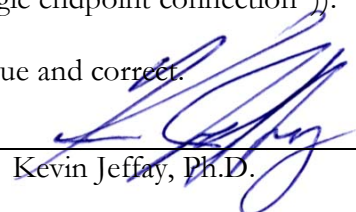
#### 10. "single endpoint communication device"

43. This term would have been readily understood by a skilled artisan, and no construction of the term is necessary. To the extent that a construction is required, a skilled artisan would have understood the term to mean "at least one endpoint communication device," as directPacket proposes.

44. The claims recite that "said at least one other controller is configured to service a single endpoint communication device." ('828 Patent at 14:14-18). A skilled artisan would have understood this to be a requirement that the other controller is configured to service at least one endpoint device, in that the claims do not otherwise limit the term. (*Compare* '828 Patent at 14:14-18 *with* 5:31-35 (describing the "one other controller as being *dedicated* for a single endpoint"), 10:49-50 (describing the backend controller as being provided "*only* for a single endpoint connection")).

I declare under penalty of perjury that the forgoing is true and correct.

Date: June 28, 2019

  
Kevin Jeffay, Ph.D.

Dated: June 28, 2019

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### CERTIFICATE OF SERVICE

I hereby certify that on this 28th day of June, 2019, I electronically filed the foregoing using the CM/ECF system, which will then send a notification of such filing (NEF) to the following:

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